

Abandoned Uranium Mine Site Assessment for the Red Bluff Nos. 1-5, 9 Site (NM0077)

FINAL REPORT

Prepared For:



New Mexico Energy, Minerals and
Natural Resources Department
Wendell Chino Building
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Prepared By:



May 28, 2010



TABLE OF CONTENTS

1.0	Introduction.....	1
1.1	Previously Known Information About the Site.....	1
1.2	Site Location and Directions	1
1.3	Site Geology	1
1.4	Site Hydrogeology.....	2
1.5	Regional Topography and Terrain	2
2.0	Mine Features.....	2
2.1	Mine Shafts, Adits, and Declines	2
2.2	Mining and Exploration Pits and Open Cuts.....	3
2.3	Waste and Ore Piles and Disturbances.....	3
2.4	Mining Related Buildings and Foundations.....	3
2.5	Other Mine Features	3
2.6	Boreholes.....	3
2.7	Reclamation Activities	3
3.0	Archeological Sites	4
4.0	Site Gamma Radiation Readings	4
5.0	Current Land Uses	4
5.1	Human Activity and Recreational Site Use.....	4
5.2	Nearby Residential, Commercial and Industrial Structures	4
5.3	Nearby Domestic Wells	4
5.4	Evidence of Grazing or Agriculture	4
5.5	Evidence of Wildlife	4
6.0	Vegetation.....	5
7.0	Potential Offsite Impacts.....	5
7.1	Erosion	5
7.2	Environmental Impacts	5
8.0	References.....	5

TABLES

Table 1	Site Features
Table 2	Gamma Radiation Survey Results

FIGURES

Figure 1	Site Location Map
Figure 2	Topographic Map
Figure 3	Aerial Photo
Figure 4a	Site Map on Aerial Photo
Figure 4b	Site Map with Surface Ownership

APPENDICES

Appendix A	Photo Log
Appendix B	Field Notes

1.0 INTRODUCTION

INTERA Incorporated (INTERA) has prepared this Abandoned Uranium Mine (AUM) Site Assessment Report for the Mining and Minerals Division (MMD) of the New Mexico Energy, Minerals and Natural Resources Department (EMNRD) in compliance with the Professional Service Agreement dated November 2, 2009. INTERA visited the Red Bluff Nos. 1, 2, 3, 4, 5 and 9 Site (AUM Site), MMD ID: NM0077 on April 6, 2010.

1.1 PREVIOUSLY KNOWN INFORMATION ABOUT THE SITE

The claims associated with this AUM Site were filed in 1950 and 1951 and were worked until 1956. Anderson (1980) visited the Red Bluff Nos. 1, 2, 3, 4, 5, and 9 in 1980, noting a series of small open cuts and trenches in the Todilto Formation. One small adit and a pond were also found. A great deal of secondary uranium mineralization was apparent at the site (Anderson, 1980).

1.2 SITE LOCATION AND DIRECTIONS

The AUM Site is on private and federal (Bureau of Land Management) land. The Site covers most of the northern 2/3 of Section 4, Township 12 North, Range 9 West and is located in Cibola County (formerly part of Valencia County), approximately 11 miles northeast of the town of Milan. The location of this site was provided to INTERA by MMD.

To access the AUM Site from Albuquerque, drive west on Interstate 40 for 83 miles. Take Exit 79 towards San Mateo and turn right. Continue straight until you reach U. S. 66, less than a quarter mile. Turn left on U.S. 66 and drive 0.2 miles, then turn right onto New Mexico 605. Continue northeast on New Mexico 605 for 7.4 miles, then turn right onto a dirt road, passing through a locked gate. Drive east along this road for approximately 2 miles, after which the road makes a slight bend to the south and then curves north and ascends a mesa. After reaching the top of the mesa, continue north for another 2.2 miles to the center of the Site.

Note that permission from two private landowners is required in order to access and view the AUM Site. The access route from New Mexico 605 to the mesa is owned by one landowner, and the eastern part of the Site is owned by a different landowner.

1.3 SITE GEOLOGY

The AUM Site lies within the Grants uranium region. This topography of this region is characterized by mesas of Triassic, Jurassic, and Cretaceous sediments separated by broad valleys. The Site area is part of the Chaco Slope, the southern part of the San Juan Basin. Strata in the Chaco Slope dip gently to the north (McLemore, 2002).

The AUM Site is located within the Jurassic-age Todilto Formation, a sequence of carbonates and evaporites. This formation likely represents a salt lake environment intermittently connected to the ocean. The Todilto Formation is underlain by the Entrada Formation and overlain by the Summerville Formation (Hilpert, 1963). The Todilto consists of two members, the upper Tonque Arroyo Member and the lower Luciano Mesa Member. The Tonque Arroyo Member consists of gypsum and is absent from the Site area. The Luciano Mesa Member consists of a

thinly laminated, locally deformed lower layer and a massive, vuggy upper layer (Lucas and Anderson, 2000). Primary-type uranium minerals such as pitchblende are reported to occur in the Todilto Limestone as well as secondary minerals such as carnotite and tyuyamunite (McLaughlin, 1963).

The western and southern portions of the Site contain extensive aeolian deposits, some of which appear to be active. Sand dunes are particularly evident in the Red Bluff No. 2 claim.

1.4 SITE HYDROGEOLOGY

The surface runoff at the AUM Site discharges to San Mateo Creek, which drains into the Rio San Jose approximately 8 miles to the southwest. There is no nearby permanent surface water.

The AUM Site is located in the Bluewater Underground Water Basin. This basin falls between the San Juan Underground Water Basin to the north, the Middle Rio Grande Underground Water Basin to the south and east, and the Gallup Underground Water Basin to the west (Edwards and Kiely, 2004). Aquifers are found in alluvium near major drainages such as San Mateo Creek and throughout the Cretaceous, Jurassic, and Triassic strata in the region. Groundwater flows southward in alluvium and northeast in Mesozoic strata (Brod, 1979).

1.5 REGIONAL TOPOGRAPHY AND TERRAIN

The AUM Site is found on the Dos Lomas Quadrangle 7.5 minute United States Geological Survey topographic map at an elevation of approximately 7000 feet above mean sea level (see Figure 2). The AUM Site is located just west of La Jara Mesa, on a broad mesa capped by the Todilto Formation.

2.0 MINE FEATURES

The mine features described below are based on the features provided to INTERA by MMD in the GIS Data Dictionary (MMD, 2009). INTERA marked the locations of the AUM Site features using a Trimble Global Positioning System (GPS), and entered details about the features into the GPS using the MMD data dictionary. Six pits, one open cut, one mine shaft, and eight piles were found onsite. Please see the Photo Log in Appendix A for photos of the AUM Site features, Table 1 for a list of the AUM Site features, and Figures 4a and 4b for the locations of the AUM Site features.

2.1 MINE SHAFTS, ADITS, AND DECLINES

One shaft was found on the Red Bluff No. 3 claim. This shaft was about 10 feet deep (see Photos 18 and 19 in Appendix A). Anderson (1980) photographed an adit on the southwest end of the Red Bluff No. 2 claim, but this adit was not seen during the present survey. This feature may have been buried beneath blow sand and was not located.

2.2 MINING AND EXPLORATION PITS AND OPEN CUTS

Six pits and one open cut were found onsite. The Red Bluff No. 1 claim had one pit (Pit-2), which consisted of a shallow, broad depression (see Photo 20 in Appendix A). The Red Bluff No. 2 claim contained one large pit (Pit-4). Overburden and some Todilto Formation were removed from this pit (see Photos 30-34 in Appendix A). No pits or open cuts were observed in the Red Bluff No. 3 claim. The Red Bluff No. 4 claim contained two small pits, Pit-5 and Pit-6. These pits were dug up to 15 feet into the Todilto Formation, and associated piles were located nearby (see Photos 36, 37, 39 and 40 in Appendix A). The Red Bluff No. 5 claim had one pit (Pit-1) and one open cut (CutLn-1). Both features were cut into the Todilto Formation (see Photos 5-7, 10-13 in Appendix A). The Red Bluff No. 9 claim had one large pit (Pit-3). Overburden has been removed from this pit, exposing Todilto Formation (See Photos 22-24 in Appendix A).

2.3 WASTE AND ORE PILES AND DISTURBANCES

Eight piles were found onsite. The Red Bluff No. 1 claim contained one pile (PilePly-5) consisting of overburden and waste rock (see Photo 21 in Appendix A). The Red Bluff No. 2 claim did not have any obvious piles, though nearby sand dunes may be overburden piles reworked by wind. The Red Bluff No. 3 claim had two piles, PilePly-3 and PilePly-4. PilePly-3 consists of low mounds of waste rock (see Photo 15 in Appendix A) while PilePly-4 consists of revegetated overburden and waste rock (see Photo 17 in Appendix A). The maximum gamma reading obtained onsite (1250 μ R/hr at 0 ft above ground) was recorded on PilePly-3. The Red Bluff No. 4 claim contained one pile area (PilePly-8; see Photo 38 in Appendix A). These piles were likely waste rock from Pit-5 and Pit-6. The Red Bluff No. 5 claim had two piles, PilePly-1 and PilePly-2. PilePly-1 was a broad, flat mound of waste rock (see Photos 2-4 in Appendix A) and PilePly-2 appeared to have overburden as well as waste rock (see Photos 8 and 9 in Appendix A). The Red Bluff No. 9 claim contained PilePly-6 and PilePly-7. PilePly-6 lies on the eastern edge of Pit-3 and represents overburden removed from the pit (see Photo 25 in Appendix A). PilePly-7 is a broad, flat mound of poorly vegetated waste rock on the extreme eastern edge of the Site (see Photo 26 in Appendix A).

2.4 MINING RELATED BUILDINGS AND FOUNDATIONS

No mining related buildings and foundations were evident at the AUM Site.

2.5 OTHER MINE FEATURES

An access road (Access-1) passes through the Site.

2.6 BOREHOLES

No boreholes were evident at the AUM Site.

2.7 RECLAMATION ACTIVITIES

No apparent reclamation activities have taken place at the AUM Site.

3.0 ARCHEOLOGICAL SITES

No apparent archeological sites were identified at or near this AUM Site.

4.0 SITE GAMMA RADIATION READINGS

One background gamma radiation reading was taken near the AUM Site, recording 21 $\mu\text{R/hr}$ at 0 ft above ground and 19 $\mu\text{R/hr}$ at 4 ft above ground. Please see Table 2 for all of the gamma radiation readings taken at the AUM Site and Figures 4a and 4b for the locations of the radiation readings.

The maximum gamma radiation reading for the AUM Site was 1250 $\mu\text{R/hr}$ at 0 ft above ground at radiation survey point Rad-7 (see Photo 16 in Appendix A) on PilePly-3. This reading was taken on a mineralized boulder from a pile of waste rock. Other notable radiation readings were taken at radiation survey point Rad-13 (1100 $\mu\text{R/hr}$ at 0 ft above ground) in Pit-3 and radiation survey point Rad-1 (800 $\mu\text{R/hr}$ at 0 ft above ground; see Photo 1 in Appendix A) on a mineralized boulder in PilePly-1.

5.0 CURRENT LAND USES

5.1 HUMAN ACTIVITY AND RECREATIONAL SITE USE

Fences, cow droppings, and cow prints indicate that the AUM Site area is active ranchland. Various pieces of metal trash found throughout the site suggest other forms of human activity.

5.2 NEARBY RESIDENTIAL, COMMERCIAL AND INDUSTRIAL STRUCTURES

No structures were sighted within a mile of the AUM Site.

5.3 NEARBY DOMESTIC WELLS

One non-domestic well (B-01341) is located about 1 mile south of the Site (NMOSE, 2008). No domestic wells lie within a mile of the Site.

5.4 EVIDENCE OF GRAZING OR AGRICULTURE

Cow droppings and cow footprints were noted in the area.

5.5 EVIDENCE OF WILDLIFE

Scrub jays, cottontails, and jackrabbits were observed onsite. Deer scat was also found. Rodent droppings were present in CutLn-1 (see Photo 13 in Appendix A).

6.0 VEGETATION

The AUM Site is located in the Coniferous and Mixed Woodland vegetation type and borders the Desert Grassland (Ecotone). Woody species at the site include Utah juniper, pinyon pine, fourwing saltbush and rubber rabbitbush. Snakeweed, narrowleaf yucca, and common sagewort were also present. Scapose bitterweed was present at the AUM Site along with grama grass, dropseed, and Indian ricegrass. Cryptogamic crust was present in areas. No noxious weeds were observed.

7.0 POTENTIAL OFFSITE IMPACTS

7.1 EROSION

No evidence of erosion was observed onsite.

7.2 ENVIRONMENTAL IMPACTS

There is no evidence of soil staining from chemicals potentially brought to the AUM Site.

8.0 REFERENCES

- Anderson, Orin J., 1980. Abandoned or Inactive Uranium Mines in New Mexico. New Mexico Bureau of Mines and Mineral Resources Open File Report 148.
- Brod, Robert C., 1979. Hydrogeology and Water Resources of the Ambrosia Lake-San Mateo Area, McKinley and Valencia Counties, New Mexico. Master's thesis. New Mexico Institute of Mining and Technology, Socorro, New Mexico.
- Edwards, Mark H. and Kiely, Jeffrey, 2004. Cibola-McKinley Regional Water Plan. Prepared for the New Mexico Interstate Stream Commission.
- Hilpert, Lowell S., 1963. Regional and Local Stratigraphy of Uranium-Bearing Rocks in Kelley, Vincent C., ed. Geology and Technology of the Grants Uranium Region. New Mexico Bureau of Mines and Mineral Resources, Memoir 15.
- Lucas, S. G. and Anderson, Orin J., 2000. The Todilto Salina Basin, Middle Jurassic of the U. S. Southwest in E. H. Gierlowski-Kordesch and K. R. Kelts, eds, Lake Basins Through Space and Time: AAPG Studies in Geology, 46, p. 153-158.
- McLaughlin, E. D., Jr., 1963. Uranium Deposits in the Todilto Limestone of the Grants District in Kelley, Vincent C., ed. Geology and Technology of the Grants Uranium Region. New Mexico Bureau of Mines and Mineral Resources, Memoir 15.
- McLemore, Virginia T., 2002. Navajo Lake State Park: New Mexico Geology, v. 24, no. 3, p. 91-96, 103.

Mining and Minerals Division (MMD), 2009. Mine Feature Data Dictionary.

New Mexico Office of the State Engineer (NMOSE), 2008. Wells and Surface Diversions in New Mexico. WATERS_PODS_may08.shapfile. OSE Waters Database.

TABLES

Table 1
Site Features

Red Bluff Nos 1, 2, 3, 4, 5 & 9-NM0077
Abandoned Uranium Mine Assessments

Feature Name	On Site?	Feature Type	Associated Feature	Material	Height or Depth (ft)	Width or Diameter (ft)	Length (ft)	Open	Collapsed	Closure Type	Associated Photo	Claim	Notes
Access-1	No	Access	--	Dirt	--	--	--	--	--	--	--	--	--
CutLn-1	Yes	--	--	--	15	30	75	--	--	--	NM0077_010 NM0077_011 NM0077_012	Red Bluff No. 5	--
PilePly-1	Yes	Waste	--	Rock	3	50	200	--	--	--	NM0077_002 NM0077_003 NM0077_004	Red Bluff No. 5	--
PilePly-2	Yes	Waste	--	Rock	10	100	150	--	--	--	NM0077_008 NM0077_009	Red Bluff No. 5	--
PilePly-3	Yes	Waste	--	Rock	3	70	100	--	--	--	NM0077_015	Red Bluff No. 3	--
PilePly-4	Yes	Waste	--	Rock	5	75	75	--	--	--	NM0077_017	Red Bluff No. 3	--
PilePly-5	Yes	Waste	--	Rock	25	150	150	--	--	--	NM0077_021	Red Bluff No. 1	--
PilePly-6	Yes	Waste	--	Soil	20	75	75	--	--	--	NM0077_025	Red Bluff No. 9	--
PilePly-7	Yes	Waste	--	Rock	5	50	200	--	--	--	NM0077_026	Red Bluff No. 9	--
PilePly-8	Yes	Waste	--	Rock	8	200	300	--	--	--	NM0077_038	Red Bluff No. 4	--
Pit-1	Yes	Mining	--	--	10	50	125	Yes	--	--	NM0077_005 NM0077_006 NM0077_007	Red Bluff No. 5	--
Pit-2	Yes	Mining	--	--	20	100	150	Yes	--	--	NM0077_020	Red Bluff No. 1	--
Pit-3	Yes	Mining	--	--	15	150	250	Yes	--	--	NM0077_022 NM0077_023 NM0077_024	Red Bluff No. 9	--
Pit-4	Yes	Mining	--	Sand, rock	25	200	300	Yes	--	--	NM0077_030 NM0077_031 NM0077_032 NM0077_033	Red Bluff No. 2	--
Pit-5	Yes	Mining	--	Rock	15	25	55	Yes	--	--	NM0077_036 NM0077_037	Red Bluff No. 4	--
Pit-6	Yes	Mining	--	Rock	8	15	35	Yes	--	--	NM0077_039 NM0077_040	Red Bluff No. 4	--
ShaftPly-1	Yes	Vertical	--	--	10	8	--	Yes	Yes	Collapsed	NM0077_018 NM0077_019	Red Bluff No. 3	--

Notes:
-- designates no information



Table 2
Gamma Radiation Survey Results

Red Bluff Nos 1, 2, 3, 4, 5 & 9-NM0077
Abandoned Uranium Mine Assessments

Reading ID	0 ft (μ R/hr)	4 ft (μ R/hr)	Associated Photo	Associated Feature
Rad-1	800	180	NM0077_001	PilePly-1
Rad-2	350	90	--	PilePly-1
Rad-3	360	130	--	Pit-1
Rad-4	250	100	--	PilePly-2
Rad-5	210	110	--	CutPly-1
Rad-6	190	80	--	PilePly-3
Rad-7	1250	100	NM0077_016	PilePly-3
Rad-8	100	40	--	PilePly-4
Rad-9	34	21	--	PilePly-4
Rad-10	15	17	--	ShaftPly-1
Rad-11	600	140	--	Pit-2
Rad-12	20	18	--	PilePly-5
Rad-13	1100	70	--	Pit-3
Rad-14	12	14	--	PilePly-6
Rad-15	250	150	--	PilePly-7
Rad-16	600	120	--	Pit-4
Rad-17	600	340	--	Pit-4
Rad-18	700	220	--	Pit-5
Rad-19	250	160	--	PilePly-8
Rad-20	600	200	--	Pit-6
RadBack-1	21	19	--	--

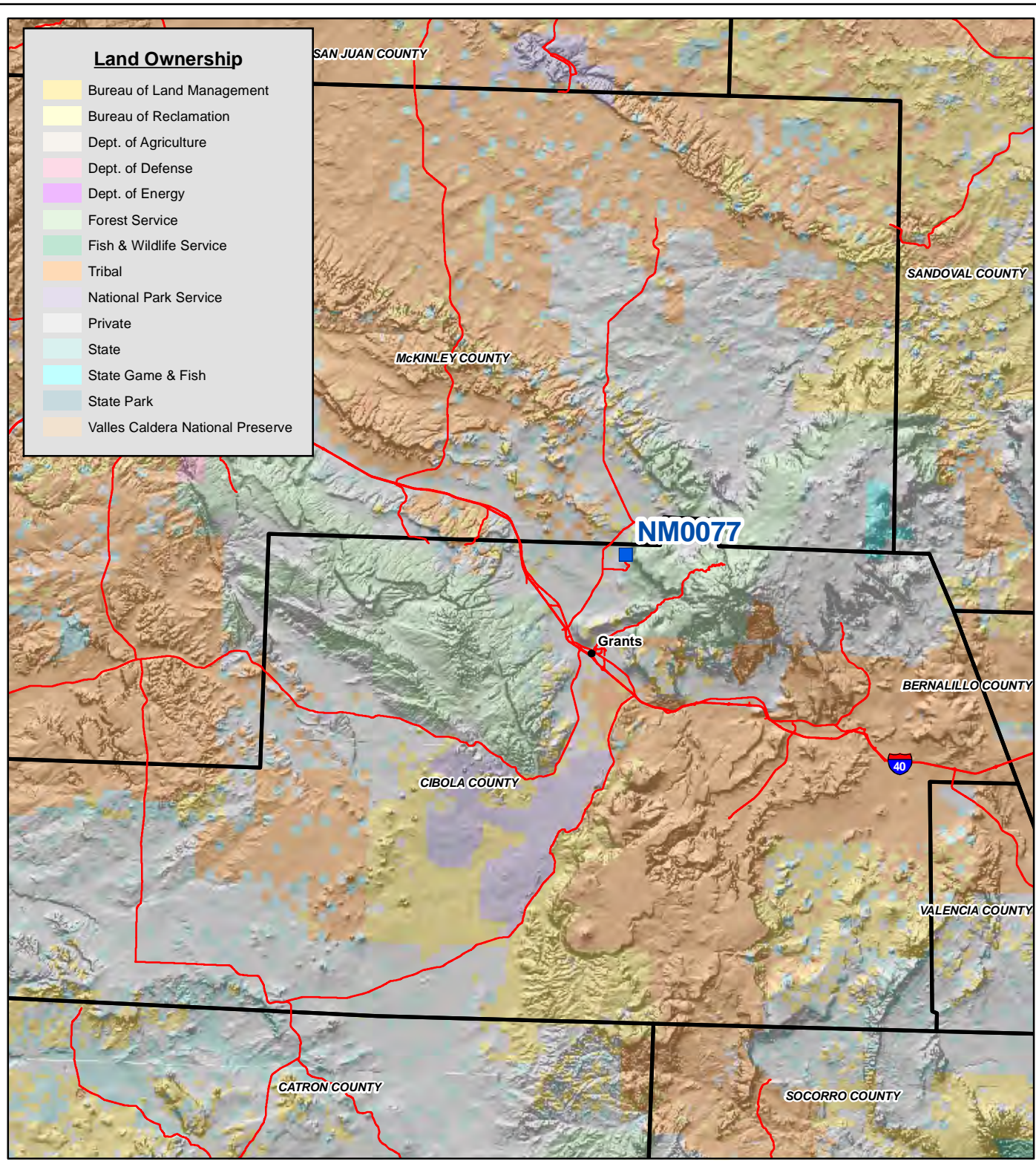
Notes:

All gamma readings at this site taken by Ludlum 192 μ R/Ratemeter

μ R/hr=microroetgens per hour

-- designates no information

FIGURES



Map Source(s):
Ownership - BLM, 2008

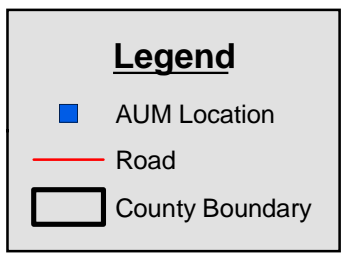
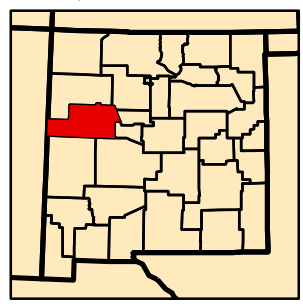
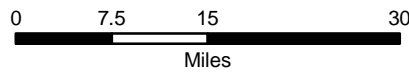
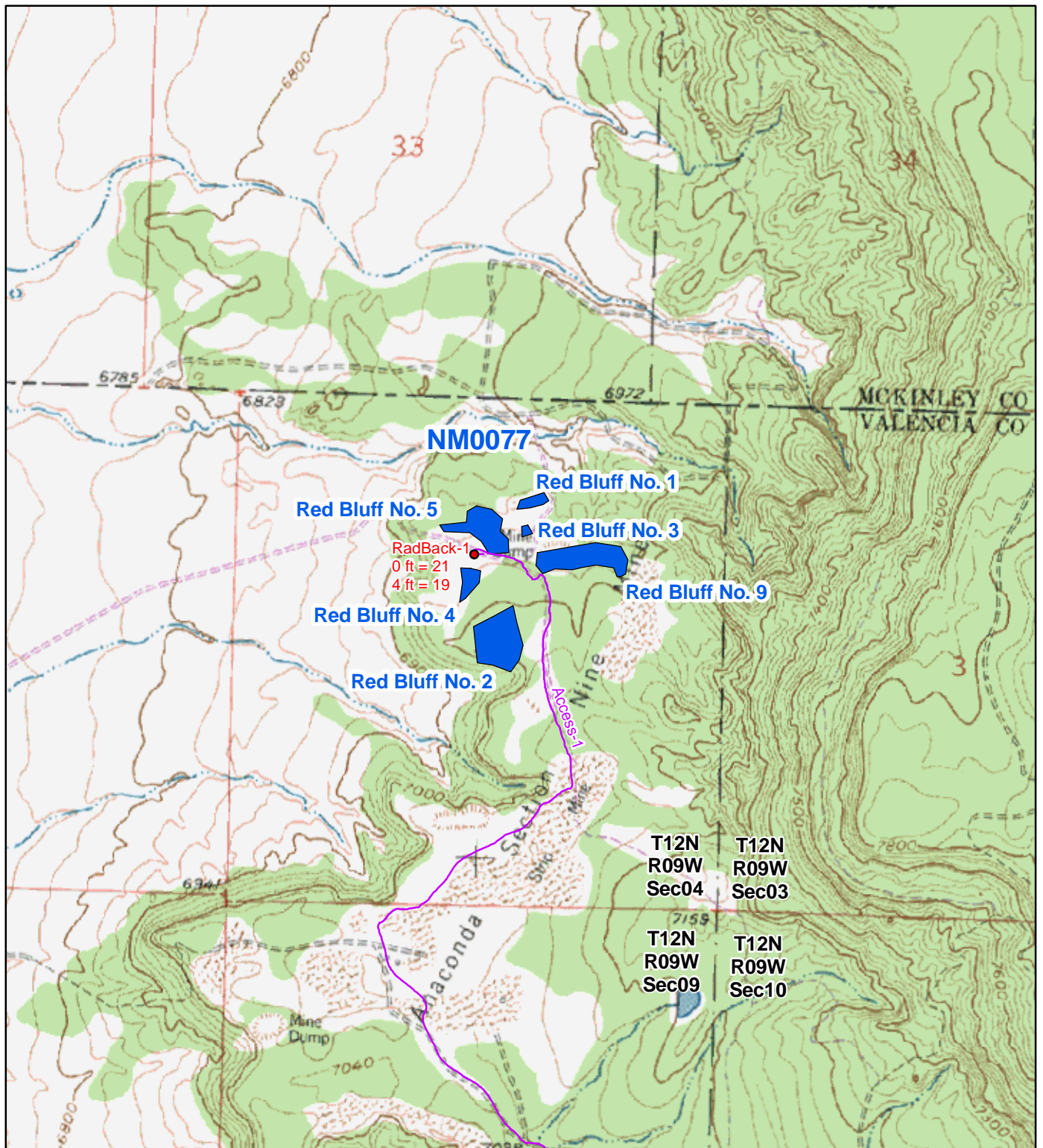


Figure 1
Site Location Map
NM0077-Red Bluff Nos. 1-5, & 9
Abandoned Uranium
Mine Assessment



Map Source(s):
U.S. Geological Survey 7.5-Minute
Topographic Map
-Dos Lomas, 1980

0 750 1,500 3,000
Feet



Note:
There are no wells within 1 mile of the Site.

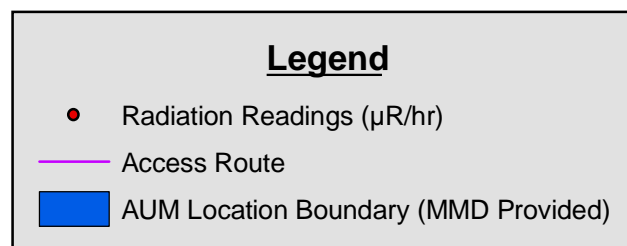
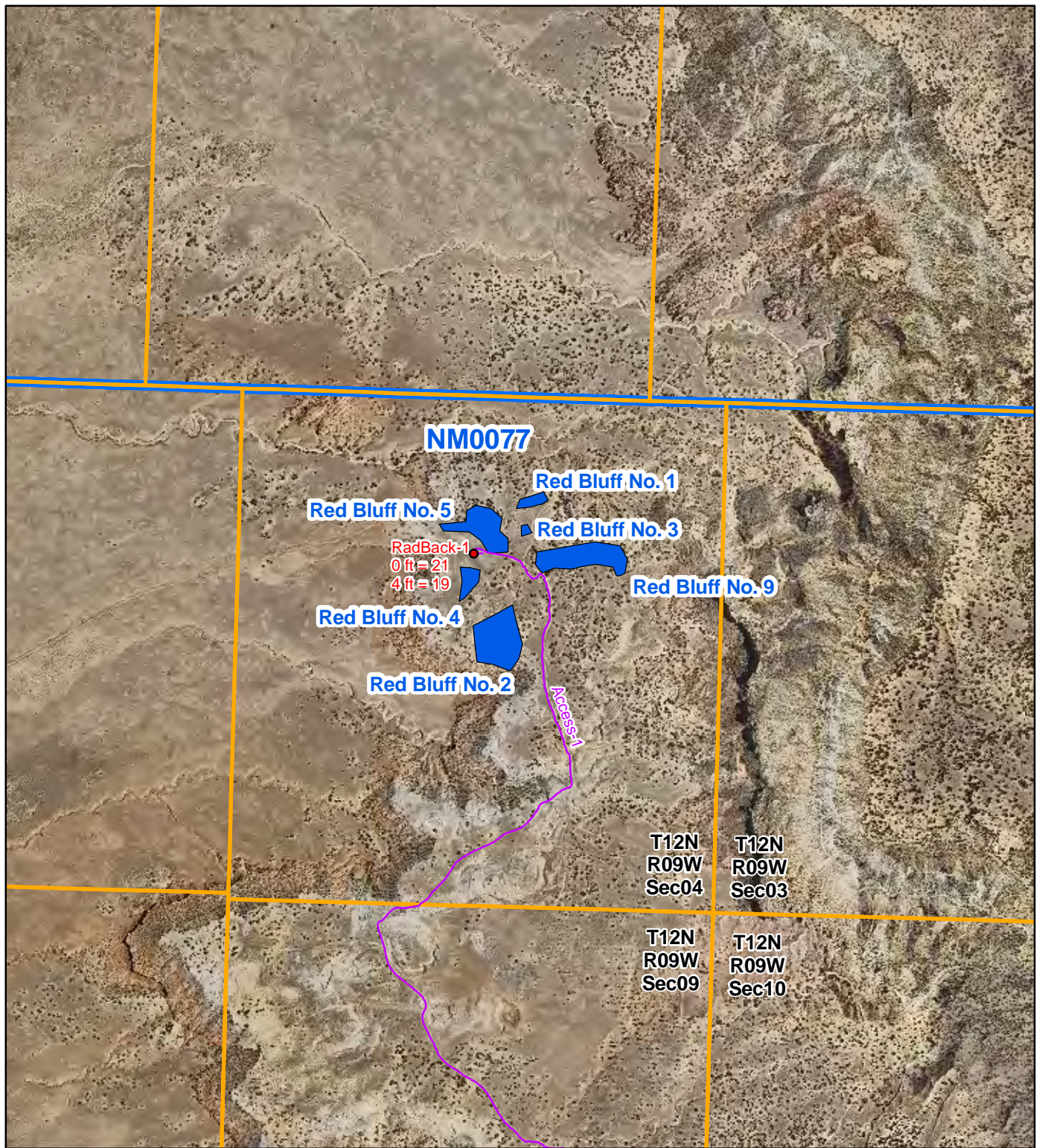


Figure 2
Topographic Map
NM0077-Red Bluff Nos. 1-5, & 9
Abandoned Uranium
Mine Assessment



Map Source(s):
 U.S. Geological Survey 7.5-Minute
 DOQQ County Mosaic
 -Cibola County, 2009
 -McKinley County, 2009

0 750 1,500 3,000
 Feet



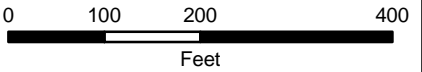
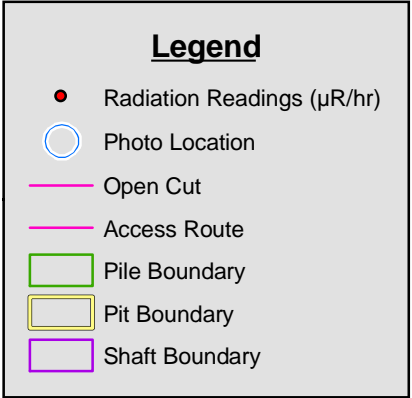
Note:
 There are no wells within 1 mile of the Site.

Legend

- Radiation Readings ($\mu\text{R/hr}$)
- Access Route
- AUM Location Boundary (MMD Provided)
- Section Boundary
- Township/Range Boundary

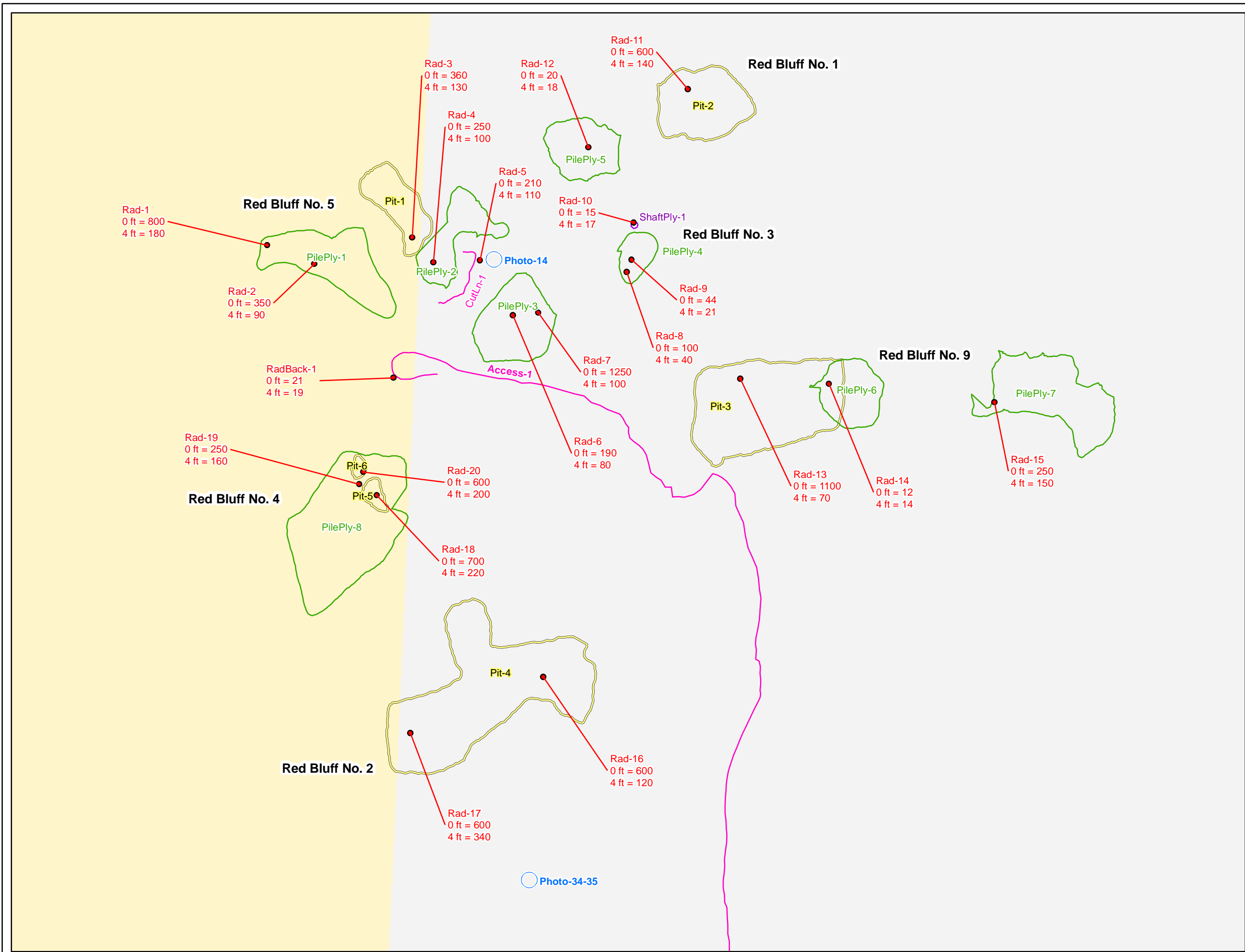
Figure 3
Aerial Photo
NM0077-Red Bluff Nos. 1-5, & 9
 Abandoned Uranium
 Mine Assessment





Map Source(s):
U.S. Geological Survey 7.5-Minute
DOQQ County Mosaic
-Cibola County, 2009

Figure 4a
Site Map on
Aerial Photo
NM0077-Red Bluff
Nos. 1-5, & 9
Abandoned Uranium
Mine Assessment

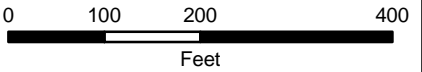


Legend

- Radiation Readings (μR/hr)
- Photo Location
- Open Cut
- Access Route
- Pile Boundary
- Pit Boundary
- Shaft Boundary

Surface Ownership

- Bureau of Land Management
- Private



Map Source(s):
Ownership - BLM, 2008

Figure 4b
Site Map with
Surface Ownership
NM0077-Red Bluff
Nos. 1-5, & 9
Abandoned Uranium
Mine Assessment

APPENDIX A

PHOTO LOG

Note: Gaps in the numbering sequence of the photos is the result of removing photos not suitable for the report. A full set of photos is provided in the electronic deliverable.



Photo 1-Radiation survey point 1 (800 μ R/hr at contact; Red Bluff No. 5 claim).



Photo 2-Looking east at PilePly-1 (Red Bluff No. 5 claim).



Photo 3-Looking north at PilePly-1 (Red Bluff No. 5 claim).



Photo 4-Looking northwest at PilePly-1 (Red Bluff No. 5 claim).



Photo 5-Looking northwest at Pit-1 (Red Bluff No. 5 claim).



Photo 6-Folded Todilto Formation in Pit-1 (Red Bluff No. 5 claim).



Photo 7-Looking south at Pit-1 (Red Bluff No. 5 claim).



Photo 8-Looking south at PilePly-2 (Red Bluff No. 5 claim).



Photo 9-Looking north at PilePly-2 (Red Bluff No. 5 claim).



Photo 10-Looking south at CutLn-1 (Red Bluff No. 5 claim).



Photo 11-Looking east at CutLn-1 (Red Bluff No. 5 claim).



Photo 12-Looking southeast at CutLn-1 (Red Bluff No. 5 claim). Note steel rods in the rock face.



Photo 13-Pack rat den and droppings in CutLn-1 (Red Bluff No. 5 claim).



Photo 14-Site photo, looking west at Red Bluff No. 5 claim.



Photo 15-Looking northwest at PilePly-3 (Red Bluff No. 3 claim), per Anderson Report Photo A.



Photo 16-Radiation survey point Rad-7 (1250 μ R/hr at contact; Red Bluff No. 3 claim).



Photo 17-Looking west at PilePly-4 (Red Bluff No. 3 claim).



Photo 18-Looking west at ShaftPly-1 (Red Bluff No. 3 claim).



Photo 19-Looking south into ShaftPly-1 (Red Bluff No. 3 claim).



Photo 20-Looking south into Pit-2 (Red Bluff No. 1 claim).



Photo 21-Looking southeast at PilePly-5 (Red Bluff No. 1 claim).



Photo 22-Looking southeast at Pit-3 (Red Bluff No. 9 claim).



Photo 23-Looking east at steel rod in Pit-3 (Red Bluff No. 9 claim).



Photo 24-Looking east at Pit-3 (Red Bluff No. 9 claim).



Photo 25-Looking east at PilePly-6 (Red Bluff No. 9 claim).



Photo 26-Looking east at PilePly-7 (Red Bluff No. 9 claim).



Photo 27-Cryptobiotic soils on the AUM Site.



Photo 30-Looking northeast at Pit-4 (Red Bluff No. 2 claim).



Photo 31-Looking northeast at Pit-4 (Red Bluff No. 2 claim).



Photo 32-Looking southwest at Pit-4 (Red Bluff No. 2 claim), replicating Photo (C) in Anderson (1980).



Photo 33-Closeup of Todilto Formation in Pit-4 (Red Bluff No. 2 claim).



Photo 34-Looking southeast from the MMD-provided shapefile on the Red Bluff No. 2 claim.



Photo 35- Looking northwest from the MMD-provided shapefile on the Red Bluff No. 2 claim.



Photo 36-Looking east at Pit-5 (Red Bluff No. 4 claim).



Photo 37-Looking north at Pit-5 (Red Bluff No. 4 claim).



Photo 38-Looking east at PilePly-8 (Red Bluff No. 4 claim).



Photo 39-Looking east at Pit-6 (Red Bluff No. 4 claim).



Photo 40-Looking south at Pit-6 (Red Bluff No. 4 claim).

APPENDIX B

FIELD NOTES

~~AM0077~~ ACT

Site Name: NM0077 - Red Bluffs Nos. 1, 2, 3, 4, 5, 9

Objective: Site Assessment

Personnel: ^{ACT} Annetti Annelia Tinklenberg
Danny Bowman

Equipment: Rental truck, Trimbel Geo XM
(SN: 4948447271), ^{ACT} 2008 series, Ludlum 192
(SN: 234149), FujiFilm digital camera (No. 80839493),
backup Garmin GPS, cell phone amplifier,
field laptop

1420 At site

Background Rad - 0m - 20 uR/h; 1m - 19 uR/h

Rad 1 - west end of Pile Ply 1; 0m - 800 uR/h; 1m - 180 uR/h

Pile Ply 1 - numerous pile ridges ^{ACT} and cones; 50' wide,
200' long; 3' high

Photo 1 - rock from Rad 1

Photo 2 - looking east at Pile Ply 1

Photo 3 - looking north at Pile Ply 1

Rad 2 - Pile Ply 1; 0m - 350 uR/h; 1m - 90 uR/h

Photo 4 - looking north west at Pile Ply 1

Pit Ply 1 - 10' deep, 50' wide, 125' long

Photo 5 - looking northwest at Pit Ply 1

Photo 6 - looking at folds in the Todiite in Pit Ply 1

Photo 7 - looking south at Pit Ply 1

Rad 3 - Pit Ply 1 - 0m - 360 uR/h; 130' ^{ACT} 1m - 130 uR/h

Pile Ply 2 - 10' high; 150' long; 100' wide

Photo 8 - looking south at Pile Ply 2

Photo 9 - looking north at Pile Ply 2

Rad 4 - Pile Ply 2 - 0m - 250 uR/h; 1m - 100 uR/h

Cutln 1 - 15' deep, 30' wide, 75' long

Photo 10 - looking south at Cutln 1

Photo 11 - looking ^{ACT} south east at Cutln 1

Photo 12 - looking southeast at Cutln 1; with
steel rods in rock face

Rad 5 - Cutln 1; 0m - 210 uR/h; 1m - 110 uR/h

Photo 13 - Pack rat den and scat in Cutln 1

Photo 14 - Site name, looking south west at Red
Bluff No. 5

Pile Ply 3 - 3' high; 70' wide, 100' long; pile ridges and
pile cone

Photo 15 - looking north west at Pile Ply 3

1500 Rad 6 - Pile Ply 3 - 0m - 190 μ R/h; 1m - 80 μ R/h

Rad 7 - Pile Ply 3 - 0m - 1250 μ R/h; 1m - 100 μ R/h

Photo 16 - Rad 7 Rock

Red Bluff No 3

Pile Ply 4 - 5' high; 75' wide; 75' long; waste rock

Photo 17 - looking west at Pile Ply 4

Rad 8 - Pile Ply 4 - 0m - 100 μ R/h; 1m - 40 μ R/h

Rad ⁹_{ACT} - Pile Ply 4 - 0m - 34 μ R/h; 1m - 21 μ R/h

Shaft Ply 1 - collapsed; 10' deep, 8' diameter

Photo 18 - looking west at shaft ply 1

Photo 19 - looking south into shaft ply 1

Rad 10 - shaft Ply 1 - 0m - 15 μ R/h; 1m - 17 μ R/h

1530 Red Bluff No 1

Pit 2 - 20' on ^{ACT} north end, 2' deep on south end
100' wide; 150' long; Todilto under blow
sand

Rad 11 - Pit 2 - 0m - 600 μ R/h; 1m - 140 μ R/h

Photo 20 - looking south into Pit 2

Pile Ply 5 - 150' diameter; 25' high; waste rock and
sediment

Photo 21 - looking southeast at Pile Ply 5

Rad 12 - Pile Ply 5 - 0m - 20 μ R/h; 18' ^{ACT} 1m - 18 μ R/h

1545 Red Bluff No 9

Pit 3; 15' deep, 150' ^{ALT} ~~long~~ wide; 250' long

Photo 22 - looking southeast at Pit 3

Rad 13 - Pit 3 - 0m - 1100 μ R/h; 1m - 70 μ R/h

Photo 23 - looking east at steel rod in Pit 3

Photo 24 - looking east at Pit 3

Pile Ply 6 - overburden sand from Pit 3, scraped
out to expose Todilto; 20' high, 75' x 75'

Photo 25 - looking east at Pile Ply 6

Rad 14 - Pile Ply 6 - 0m - 12 μ R/h; 1m - 14 μ R/h

Pile Ply 7 - 5' high; 50' wide; 200' long; waste rock

Photo 26 - looking east at Pile Ply 7

Rad 15 - Pile Ply 7 - 0m - 250 μ R/h; 1m - 150 μ R/h

Photos 27-29 - cryptobiotic soils

1620 Red Bluff No 2

Pit 4 - aeolian sand on top of ^{ALT} ~~Todilto~~ Todilto
25' deep; 300' long, 200' wide

Rad 16 - Pit 4; 0m - 600 μ R/h; 1m - 120 μ R/h

Photos 30-31 - looking ^{ALT} ~~south~~ northeast at Pit 4

Photos 32-33 - looking southwest at Todillo cut in Pit 4

Rad 17 - Pit 4; Om - 600 μ R/h; Im - 340 μ R/h

Photo 34 & 35 - looking southeast and northwest in Red Bluff No. 2 polygon

1700 Red Bluff No 4

Pit 5 - 15' deep, 25' wide, 55' long

Rad 18 - Pit 5 - Om - 700 μ R/h; Im - 220 μ R/h

Photo 36 - looking east at Pit 5

Photo 37 - looking north at Pit 5

Pileply 8 - waste rock, numerous cones 8' high, 300' long, 200' wide

Photo 38 - looking east at cones in Pileply 8

Rad 19 - Pileply 8 - Om - 30 μ R/h; Im - 160 μ R/h

Pit 6 - 8' deep; 15' wide; 35' long

Photo 39 - looking east at Pit 6

Photo 40 - looking south at Pit 6

Rad 20 - Pit 6 - Om - 600 μ R/h; Im - 200 μ R/h

Soils: tan, sandy; red-tan; rocky, grey locally

Rocks: Grey Todillo Limestone, some tan-red sandstone, ~~act~~ Entrada

Human Activities: Grazing, fences, cowpicks, cowpies
Past mining activity; various metal trash throughout area

Wildlife: scrub jays, cottontails, jackrabbit, packrat, deer scat.

